

1. A method of producing high grade coke from low grade material without causing a pollution problem, comprising the acts of:

displacing without elutriation a mixture of low grade non-coking inexpensive coal fines and another type of inexpensive carbonaceous fines comprised of waste coke fine, as a feedstock influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging coke and pyrolytic by-products as effluents from the pyrolyzer.

2. A method according to Claim 1 further comprising the acts of:

feeding back tar effluent by-product from the pyrolyzer to the feedstock influent mixture;

feeding back combustible off-gas effluent by-product from the pyrolyzer to the pyrolyzer and using it as a source of fuel in the pyrolyzer.

3. A method according to Claim 1 further comprising the act of obtaining a mixture comprising waste coal fines and waste coke fines prior to the introducing act.

4. A method according to Claim 1 further comprising the act of crushing low grade coal and/or the carbonaceous waste coke prior to the introducing act, to obtain the fines.

5. A method according to Claim 1 further comprising the act of forming the mixture using a liquid binder into solid objects prior to the introducing act.

6. A method according to Claim 1 wherein the discharging act comprises discharging the coke as solid objects.

7. A method according to Claim 2 wherein the first feeding act comprises combining the feedback tar, a synthetic binder and the mixture of fines prior to the introducing act.

8. A method according to Claim 2 wherein the by-product tar is fed back mixed with another binder additive and combined with the mixture of coal fines and waste coke fines prior to the introducing act.

9. A method according to Claim 1 wherein the discharging act comprises cooling the by-products and condensing tar to separate the tar from off-gas.

10. A method of producing coke from a mixture of non-prime coal fines and waste coke fines comprising the acts of:

displacing a mixture of low grade coal fines and another type of carbonaceous comprising waste coke fines without elutriation of the fines as a feedstock influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging segregated coke and pyrolytic by-products as effluents from the pyrolyzer.

11. A method according to Claim 10 further comprising the acts of:
 - separating the pyrolytic by-products into tar and combustible off-gas;
 - combining the separated tar as a binder with the mixture of coal and coke fines in the mixture;
 - returning the combustible off-gas to the pyrolyzer as a source of fuel.
12. A method according to Claim 10 wherein the introducing act comprises obtaining a mixture comprising waste coke fines and waste coal fines.
13. A method according to Claim 10 further comprising the act of crushing at least some of the coke and/or the coal, prior to the introducing act.
14. A method according to Claim 10 further comprising the act of forming the mixture using a liquid binder into solid objects prior to the introducing act.
15. A method according to Claim 14 wherein the discharging act comprises discharging the coke from the pyrolyzer as solid objects.
16. A method according to Claim 11 wherein the combining act comprises combining the separated tar, a synthetic binder and the mixture of coal and coke fines prior to the introducing act.

17. A method according to Claim 11 wherein the separated tar is fed back to the coal and coke mixture prior to the introducing act.

18. A method according to Claim 11 wherein the separating act comprises cooling the by-products to condense tar to separate the tar from off-gas.

19. A method of producing coke from low grade coal and coke fines, comprising the acts of:

obtaining and mixing low grade coal fines and coke fines;
displacing without elutriating the mixture of lower grade coal fines and waste coke fines as an influent into a pyrolyzer;
pyrolyzing the mixture in the pyrolyzer;
discharging segregated coke and pyrolytic by-products comprising combustible off-gas and tar as effluents from the pyrolyzer;
separating the pyrolytic by-products into segregated tar and combustible off-gas;
returning the segregated tar as a binder to the coal and coke fines mixture;
returning the segregated combustible off-gas to the pyrolyzer as a source of fuel.

20. A method according to Claim 19 further comprising the act of crushing oversized waste coke and/or oversized low grade coal, to correctly size the fines.

21. A method according to Claim 19 further comprising the act of forming the mixture into solid objects using a binder prior to the introducing act.

22. A method according to Claim 21 wherein the discharging act comprises discharging the coke from the pyrolyzer as solid objects.

23. A method according to Claim 19 wherein the adding act comprises combining the separated tar, a synthetic binder and the mixture of coal and coke fines prior to the introducing act.

24. A method according to Claim 19 wherein the separated tar is fed back to the mixture of coal and coke fines.

25. A method of producing coke from a mixture of non-prime coal fines and waste coke fines comprising the acts of:

introducing a mixture of low grade coal fines comprising 20-40% by weight and another type of carbonaceous comprising waste coke fines comprising 45-80% by weight as a feedstock influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging segregated coke and pyrolytic by-products as effluents from the pyrolyzer.

26. A method according to Claim 25 wherein the coke fines comprise petroleum coke fines comprising 40-70% by weight of the coal and coke mixture.

27. A method according to Claim 25 wherein the coke fines comprise coke breeze fines comprising 5-10% by weight of the coal and coke mixture.

28. A method according to Claim 25 wherein the pyrolyzing act comprises heating the introduced mixture to a temperature within the range of 800-1100°C at a rate within the range of 1500-2000°C/hour to lower coke volatility below 2%.

29. A method according to Claim 25 wherein the separating act comprises cooling the by-products to about 300°C and condensing the tar to separate the tar from the off-gas.

30. A method of producing high quality coke from a mixture of low grade and/or waste carbonaceous materials at a much lower cost comprising the acts of:

absent elutriation, displacing a mixture of low grade coal fines and waste coke fines as an influent into a pyrolyzer;

pyrolyzing the mixture of fines in the pyrolyzer;

discharging the coke, and pyrolytic by-products from the pyrolyzer.

31. A method according to Claim 30 wherein the by-products comprise tar and combustible gas and further comprising the acts of:

condensing the tar;

using the tar as a binder for the mixture of coal and coke;

using the combustible off-gas as a source of fuel in the pyrolyzer.

32. A method of producing coke from non-traditional carbonaceous materials comprising the acts of:

displacing a mixture of waste coke fines and non-coking grade coal fines, absent washing during said displacement, as an influent into a pyrolyzer;

pyrolyzing the mixture in the pyrolyzer;

discharging coke, and pyrolytic by-products comprising combustible off-gas and tar as effluents from the pyrolyzer.

33. A method according to Claim 33 comprising the further acts of:

condensing the tar to separate the tar and off-gas;

using the tar as a binder for the mixture fines prior to the mixing act;

using the combustible off-gas as a source of fuel in the pyrolyzer.

34. A method according to Claim 33 wherein all condensed tar is utilized as binder and all combustible off-gas is used to fuel the pyrolyzer.

35. A method according to Claim 33 wherein the condensed tar is the sole binder source and the combustible off-gas is the sole source of fuel for the pyrolyzer.

36. A method of cost effectively producing high quality coke from a mixture of non-traditional carbonaceous materials comprising the acts of:

displacing into a pyrolyzer a mixture comprising low grade coal fines and coke fines as salvage from prior production of coke, without washing or elutriating the mixture; pyrolyzing the mixture and obtaining segregated coke and by-products.

37. A method of producing coke, comprising the acts of:

mixing a binder, low grade non-prime coal fines selected from the group consisting of waste non-coking coal fines and non-coking coal fines and salvage coke fines selected from the group consisting of waste petroleum fines, waste char fines and waste coke breeze, without regard to a free swelling index value and without washing the mixture;

introducing the mixture into a pyrolyzer without elutriation;

pyrolyzing the mixture to derive coke, tar and combustible off-gas.

38. A method according to Claim 37 wherein the method is performed in a closed system and further comprising the acts of:

causing all of the tar to comprise the binder;

fueling the pyrolyzer with all of the combustible off-gas.